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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,901	12/08/2003	Mitsushi Ikeda	04329.3193	9313

22852 7590 02/22/2006

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EXAMINER	
SUNG, CHRISTINE	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/728,901	IKEDA ET AL.	
	Examiner	Art Unit	
	Christine Sung	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

1. The amendment filed on December 5, 2005 has been accepted and entered.

Claim Objections

2. Claim 4 is objected to because of the following informalities: Claim 4 discloses that the metal halide film could be "CdT_2" but T is not a known element in the periodic table. It is unclear if it was meant to be CdTe or Cd_2T or CdI_2. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 3, 4, 5, 14 and 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The independent claim discloses using metal halides with a hexagonal crystal structure. However, the dependent claims disclose, for example, HgI_2 a tetragonal crystal structure, InI an orthorhombic crystal structure, InI_3 has a monoclinic structure, and therefore does not enable the invention because the independent claim requires the metal halide films to be laminated along the c-axis of the hexagonal structure. (See attached MatWeb references that show the crystal structure property of the referenced crystals, and also see attached definitions of the Callister reference for the crystal classification). The claim requires lamination along the c-axis of the

hexagonal structure, but the dependent claims cite crystals that have other crystal structures which inherently cannot be laminated in the claimed direction.

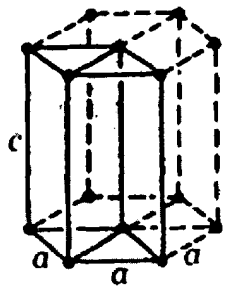
Drawings

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the definition of the direction of the c-axis within the laminate structures must be shown or the feature(s) canceled from the claim(s).

The examiner respectfully requests that the inventor provide a figure, (see below figure for an example) of a hexagonal crystal structure with the c-axis and a-axis defined, as it is claimed. Figure 5 contains some sort of crystal structure, but does not define axes and does not clearly define the lamination structure. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.



(Figure from *Materials Science and Engineering and Introduction,* Callister, William D., Copyright 1997, Pg 38)

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-4, 6, 7, 9, 11-13, 15-16, 18 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Ikeda (US Patent 6,403,965 B1).

The applied reference has a common assignment with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the

inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding claim 1, Ikeda disclose a flat panel x-ray detector (figure 2) which comprises:

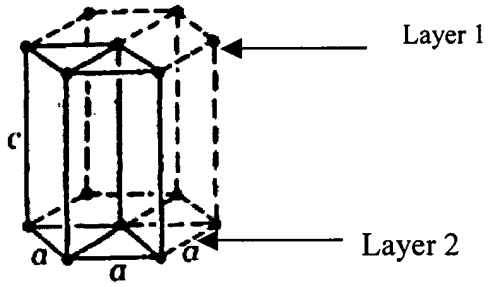
an X-ray-charge conversion film converting incident X-rays into electric charges (Figure 2, elements 208-211);

and a pair of electrodes (elements 212 and 103) disposed in contact with both surfaces of said X-ray-charge conversion film (see figure 2, where 212 and 103 are disposed on opposite ends of the conversion film);

wherein said X-ray-charge conversion film has a laminate structure (Figure 2, elements 208-211) including a plurality of metal halide films laminated (Claim 1, column 12, line 66- column 13, line 2) and differing in band gap from one another or differing in resistivity (Claim 1, column 12, line 66- column 13, line 2, materials of different resistivity inherently have different bandgaps), and halogen atoms contained in said plurality of metal halide films are of the same kind among them (column 10, lines 1-3). Ikeda discloses that the laminated materials are hexagonal structured elements such as PbI_2 (column 12, lines 24-26), but does not explicitly state that they are laminated in the direction of the c-axis. However, it is inherent that the layers of a hexagonal structure must be laminated within the c-axis because there are no other planes in which the layering could occur.

Regarding claim 2, Ikeda discloses a flat panel X-ray detector according to claim 1, and further discloses that the electrodes are a conductive film (aluminum, (column 7, line 7)), and further states that the metal halide can be either PbI2 (column 12, lines 24-26) or HgI2 (Column

12, lines 24-26). Although Ikeda does not explicitly state that the elements are lattice matched, however, it is inherent that they are because the metal halide is a hexagonal crystal structure and the aluminum a Face-centered cubic structure (this is an inherent property of Aluminum, see attached Material Guide), which makes the elements lattice matched.



Regarding claim 3 and 4, Ikeda discloses that the metal halide film comprises at PbI_2 (column 12, lines 24-26).

Regarding claim 6, Ikeda discloses a plurality of metal halide films comprise metal halides which are the same in kind with one another but differ in conductivity type from one another (or resistivity, as resistivity is the inverse of conductivity) (Claim 1, column 12, line 66-column 13, line 2).

Regarding claim 7, Ikeda discloses that the plurality of metal halide films comprise an n-type metal halide film and a p-type metal halide film (column 10, lines 13-18).

Regarding claim 9, Ikeda discloses a flat panel X-ray detector wherein said plurality of metal halide films comprise an n-type metal halide film, an i-type metal halide film and a p-type metal halide film (column 10, lines 13-18).

Regarding claim 11, Ikeda discloses that the plurality of metal halide films comprise mixed crystalline metal halides which are the same in kind with one another but additionally contain different kinds of metal elements therein (i.e. PbI_2 (column 12, lines 24-26) and HgI_2 (Column 12, lines 24-26)).

Regarding claim 12, Ikeda discloses that the plurality of metal halide films comprise a PbI_2 (column 12, lines 24-26)

Regarding claim 13, Ikeda discloses a flat panel X-ray detector wherein said plurality of metal halide films comprises various kinds of metal halides (Column 10, lines 1-3, which discloses PbI_2 and Column 12, lines 24-26, which discloses HgI_2).

Regarding claim15, Ikeda discloses that the electrode is made of Aluminum (column 7, line 7) comprise a face-centered cubic structure (this is an inherent property of Aluminum, see attached Material Guide) having a-axis which is approximately equivalent to (110) (This is an inherent property of a face centered cubic structure).

Regarding claim 16, Ikeda discloses a flat panel X-ray detector which comprises:

an X-ray-charge conversion film converting incident X-rays into electric charge (Column 12, line 66- Column 13, line 2);

pixel electrodes formed on said X-ray-charge conversion film to correspond with each of pixels which are arranged in a form of array (Column 12, lines 51-54 and 58-59);

switching elements each electrically connected with each of said pixel electrodes (Column 12, lines 60-65);

signal lines each electrically connected with said switching element of each row (Column 12, lines 60-65);

scanning lines each electrically connected with said switching element of each column (column 12, lines 47-49);

and a common electrode which is disposed on one of the surfaces of said X-ray-charge conversion film, which is opposite to the surface where said pixel electrodes of said X-ray-charge conversion film are disposed (Figure 2, element 212);

wherein said X-ray-charge conversion film has a laminate structure (Figure 2, elements 208-211) including a plurality of metal halide films laminated (Claim 1, column 12, line 66- column 13, line 2) and differing in band gap from one another or differing in resistivity (Claim 1, column 12, line 66- column 13, line 2, materials of different resistivity inherently have different bandgaps), and halogen atoms contained in said plurality of metal halide films are of the same kind among them (column 10, lines 1-3). Ikeda discloses that the laminated materials are hexagonal structured elements such as PbI_2 (column 12, lines 24-26), but does not explicitly state that they are laminated in the direction of the c-axis. However, it is inherent that the layers of a hexagonal structure must be laminated within the c-axis because there are no other planes in which the layering could occur.

Regarding claim 18, Ikeda discloses that the metal halide films comprise a plurality of PbI_2 (column 12, lines 24-26).

Regarding claim 20, Ikeda discloses a flat panel X-ray detector according to claim 1, and further discloses that the electrodes are a conductive film (aluminum, (column 7, line 7)), and

further states that the metal halide can be either PbI2 (column 12, lines 24-26) or HgI2 (Column 12, lines 24-26). Although Ikeda does not explicitly state that the elements are lattice matched, however, it is inherent that they are because the metal halide is a hexagonal crystal structure and the aluminum a Face-centered cubic structure (this is an inherent property of Aluminum, see attached Material Guide), which makes the elements lattice matched.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 5, 8, 10, 14, 17 and 19 are rejected under 35 U.S.C. 103(a) as being obvious over Ikeda (US Patent 6,403,965 B1).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37

CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Regarding claim 5, Ikeda discloses the limitation set forth in claim 1 (see aforementioned paragraphs). Ikeda further discloses that the metal halide film comprises PbI_2 (column 12, lines 24-26) or HgI_2 (Column 12, lines 24-26), and that the electrodes (made of aluminum, (column 7, line 7)), comprises a face-centered cubic structure (this is an inherent property of Aluminum, see attached Material Guide). Ikeda does not specify that the lattice constant is 6.45 angstroms and does not state that the lattice mismatch between the metal halide and the electrode is less than 20%. However, the lattice constant is an inherent property of the material used and is therefore dependent on the material chosen as the electrode. The claimed lattice constant of 6.45 angstroms is a property of gold. One of ordinary skill in the art would be motivated to use a gold electrode as such an electrode is a conventional electrode material that provides superior conductivity over aluminum. Further, one of ordinary skill in the art would be motivated to

reduce the lattice mismatch between the electrode and the metal halide layer in order to reduce internal damage (i.e. cracking or peel of laminated layer).

Regarding claims 8, 10, 14, 17 and 19, Ikeda discloses the flat panel X-ray detector and further discloses that the plurality of metal halide films comprise PbI_2 films (column 12, lines 24-26). Further Ikeda discloses using dopants and making layer n-type, p-type or i-type, in order to increase the resisitivity and control of the detection layers (column 7, lines 10-26). Although he does not explicitly disclose the claimed layers, one of ordinary skill in the art would be motivated to use the compositions as claimed in order to produce the desired amount of holes/electrons and/or conductivity.

Response to Arguments

11. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. US Patent 6,507,026 B2- commonly assigned application

b. US Pre Grant 2001/0008271A1- commonly assigned application

c. US Patent 6,933,503 B2- this reference discloses a planar x-ray detector using GaAs with a multilayer conversion element.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Sung whose telephone number is 571-272-2448. The examiner can normally be reached on Monday- Friday 7-3 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christine Sung
Examiner
Art Unit 2884

CS

OTILIA GABOR
PRIMARY EXAMINER